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Title The Causes and Circumstances of Sudden Death in Rural Counties

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THE PROBLEM

With the improved techniques and potentially greater availability of emergency care, it has become increasingly apparent there is a need for a comprehensive epidemiological study of sudden and unexpected deaths in a large population. Without knowledge of the proportion of sudden deaths in the community, the individuals most likely to be affected, the place of most frequent occurrence, and the major causes of sudden death, it is impossible to define the focus as well as the personnel and equipment necessary to meet this health problem. The paucity and narrow scope of the existing literature on the subject, however, gives little recognition to this need. Not only is there no reporting of sudden and unexpected deaths as a separate and reportable disease in national vital and health statistics,[7] but there is no standard definition by which such cases may be reported. This lack of uniformity in the definition of sudden death usually revolves around the interval from onset of the terminal episode to time of death and currently ranges from one to twenty-four hours.[2]

Most of the studies carried out thus far have been retrospective reviews of medical examiner's cases or prospective studies of specific diseases in which data is available regarding the incidence of sudden death by one disease only. Both types of studies fail to constitute a reliable measurement of the total number of sudden deaths that occur in a community. A study of medical examiner's cases is open to bias because it is possible that all cases of sudden death, especially those from the upper socioeconomic groups, are not likely to be referred to his office, and that some of these cases might be non-sudden medically unattended deaths. The disease incidence studies are limited as well because they fail to consider other possible etiologies.

Until recently there have been no reports of a study of the total frequency of sudden death that includes both the cases referred and not referred to the medical examiner within a definite community.[2] Kuller et al have published two reports on such a study on the population of Baltimore, Maryland.[5,6] These papers relate demographic variables to the causes and circumstances of sudden and unexpected natural deaths in this urban population between June, 1965, and June, 1966. An earlier study[7] done by the medical examiner's office of the same city studied the incidence of sudden natural deaths among automobile drivers over a four year period--1957 to 1960--and showed by autopsy that 81 cases (19%) of all sudden deaths occurring in the drivers of automobiles were due to natural causes, pointing to a limitation inherent in all studies of sudden natural death which exclude those deaths apparently due to unnatural causes. (See Data Collection section under Methods for definition of "Unnatural Cause of Death".)

This paper will concern both natural and unnatural causes of all sudden deaths in a rural population for the year 1967. After confining our study to a rural population the decision was made to include two counties in an effort to obtain a representative view of these rural deaths. This addition came, however, at the cost of introducing two independent systems of reporting. Although the State of California has set up a list of deaths which must be handled by the coroner (section 27491 of the government code), the ultimate decision as to how thorough an investigation is carried out rests with the individual county coroner. It must be considered therefore that the coroner system may vary from county to county depending on the facilities and funds available, the autopsy rate, the quality and number of pathologists on the staff, the workload on the system, and the training and interests of the coroner, who in most counties is not a physician.

Apparent differences in sudden death rates between counties might then result entirely from differences inherent in the ways of reporting rather than an actual difference in incidence. Or indeed, for the same reasons, an apparent similarity in rates might well mask a marked difference in incidence. A comparison of the coroner's systems was therefore added to the study with the aim of reducing the number of intermediate variables casting doubt upon any revealed differences in sudden death rates between counties.

Aside from defining the differences between the Coroners' offices in the two counties, there is a greater problem inherent in a study such as this: How does one validate the actual cases of sudden death in the population? This problem arose because many of the death certificates were incomplete as to the interval between onset of the final illness and death, and also because several certificates which appeared to be sudden by the reported interval turned out to be chronic after reviewing other sources of information. Therefore a validation procedure was developed which made use of the coroner's reports, hospital records and interviews with physicians as well as the death certificates.

PURPOSE

The aim of this paper is to present a comprehensive retrospective study of the causes and circumstances of all sudden and unexpected deaths in rural counties. The study was conducted in Stanislaus and Merced counties, two rural areas in California's San Joaquin Valley; the combined population at risk, aged 0-64, numbers approximately 265,000. The choice of such a relatively small population for doing a retrospective study of sudden deaths in one year (1967) was based on the intent to include all causes of death and do an in-depth study of the reporting in each case. (There was, then, no sampling done at any stage in the study.) Mortality rates in the two counties were compared in an effort to obtain a representative picture of sudden death in rural areas in general. Each death was considered in relation to many intermediate variables shared with an earlier study of a highly urban population to allow for a comparison revealing any urban-rural differences in the pattern of incidence.

Because two counties were included in the study it first became necessary to compare the two coroners' offices to assure that no differences--or similarities --between counties could be ascribed solely to a difference in the systems of reporting. In addition it was found necessary to validate each sudden death. The actual descriptive study of sudden death was therefore preceded by a validation procedure for each sudden death and an investigation of the reporting system in each county.

METHODS

Source of Information The data for this study was gathered from several sources: The cases of sudden death came initially from the death certificates for 1967 on file in the office of the county Public Health Officer; further information used to validate these deaths as sudden and to study the reporting was obtained from the county coroner's reports, autopsy results, hospital records, and consultation with certifying physicians (usually by telephone). Multiple sources were used whenever possible but only in a few cases was it found necessary to draw on all of the above.

Populations Sudden death (numerator) is defined as "death as a result of all causes, of a person not restricted to his home, a hospital or an institution or unable to function in the community for more than twenty-four hours prior to death. The interval from onset of the fatal event until death must have been less than twenty-four hours."[4] Maintaining a definition of sudden death in common with Kuller's study allowed a comparison of our data on non-traumatic sudden death with his to reveal any differences between sudden death in rural and highly urban areas. This population consists of all those deaths in the year 1967 in which the interval between onset and death was less than twenty-four hours and otherwise complied with our definition. Deaths of nonresidents who died within the county were included with the hope that this would not introduce a significant bias.

The Population at Risk (denominator) is defined for this study as the entire population of Merced and Stanislaus Counties under the age of 65. The deaths beyond age 65 were omitted because in this group the disease is more often chronic and the cause of death multifactorial, making the assignment of a specific cause often specious. It is hoped that the benefit accrued from concentrating on the segments of the county with longer life expectancies has outweighed the adverse effect of this reduction in comprehensive nature of the study. A description of the entire population at risk was made by age group, race, and sex for each county. This was obtained when possible from the available statistics for 1967 and otherwise from our own projections based on the 1960 general census, taking into consideration county growth during the interim and assuming a constant proportion of people of Spanish surname.

Information on all deaths occurring in the population at risk in 1967 was obtained from the death certificates, thus permitting a comparison between sudden and not sudden deaths by selected demographic variables.

Survey Procedures The initial problem in this study was to discover the total number of sudden deaths in the population for the year 1967. This required hand sorting of all the death certificates for that year and copying onto the data abstraction sheet the pertinent information for all deaths under age 65, both sudden and not sudden. Certificates so selected were then placed into one of three categories:

1) "Sudden" - All certificates with a recorded interval between onset of terminal episode and death of less than 24 hours

2) "Questionable" - All certificates on which no interval was recorded and the disease was not obviously chronic, or the interval listed was ambiguous (e.g., one day, acute).

3) "Not Sudden" - All certificates on which the listed interval was clearly more than 24 hours, or if no interval was listed but the disease was obviously chronic (e.g., carcinomas).

Group 3 was given no further investigation and was used eventually for a comparison between sudden and not sudden death. Groups 1 and 2 were next studied in depth to determine whether each was an authentic case of sudden death. Coroner's records, available autopsy results, hospital records, and physicians' testimony were used to determine whether the interval between onset and death was less than 24 hours. In cases where adequate hospital records were available the certifying physician was not contacted, as presumably these records were recorded by the physician. In all coroner's cases available hospital records were also reviewed, and only when this was not possible was the physician consulted.

Each source was weighted as follows with regard to its significance in reporting:

1) Hospital records were assigned the heaviest priority in determining the interval--whether corroborating or not. (i.e., If the hospital records said less than 24 hours and the coroner's report said more than 24 hours, the case was considered a sudden death.)

2) The second heaviest weighting was assigned to physicians. They were consulted only in the absence of complete hospital records and outweighed the coroner's report and the death certificate.

3) Coroner's reports had the third heaviest weighting.

4) Death certificates had the least weight in this scoring system.

Any cases that were still questionable after this screening procedure, i.e., in which the interval was still undetermined, were discarded from the study. (Only 3 such cases were encountered.)

Information pertaining to the interval was systematically recorded for each source so that agreement or disagreement among the various sources consulted on each case would be clearly noted.

Data Collection All data was collected mainly from the death certificate, which was a standard form in each county. Only when the interval between onset and death or the cause of death was absent or ambiguous on the death certificate, or when either was contradicted by another source, was there any deviation from this pattern. In most cases these other sources were used only for confirmation, with the consistency of reporting noted on each case. The individual variables recorded are listed on the data abstraction sheet attached to this report; only a few require further comment:

Race - In previous studies in large urban areas (2, 4, 5) it was apparent that there was a substantial difference between the sudden death mortality rates of the white and Negro races. (Though this difference is most likely due to cultural and socioeconomic factors, it fell out in a racial breakdown.) In these two counties, where there is a small Negro population, the white race was broken down into two groups: "White" and "Spanish surname". The latter were separated from the rest of the Whites in an attempt to reveal any difference in the rate of sudden death between these groups irrespective of other variables. (The underlying assumption being that they hold a relative position on the socioeconomic scale similar to the Negroes in the Baltimore study.)

Place of Residence - The last permanent residence of the decedent is listed on the death certificate and then coded by "Within city limits" or "Outside city limits: On farm, or not on farm". Only the latter information was recorded on the data abstraction sheet.

Occupation - The population was also broken down by occupation in an attempt to reveal a high risk group under this variable. An agricultural-nonagricultural separation was chosen in view of the fact that agriculture is the primary industry in both counties. Agricultural occupation was defined as farmers, domestic and migrant farm laborers, and associated industries whose main function is servicing farms. "This includes not only livestock and crop farming but cotton ginning, spraying and other horticultural and husbandry services."[6]

Coroner or Physician Certification - Since the coroner's system was to be studied as a means of comparing the reporting between the counties, the number of coroner's cases among the sudden deaths and how they were handled was noted.

Cause of Death - Since it was sought to discover whether a rural population was exposed to the same health risks as a large urban population, the following categories were used in common with Kuller's study and the mortality rate compiled for each:

NATURAL
1. Cerebrovascular disease
2. Rheumatic Heart Disease
3. ASHD - listed as such specifically
4. Hypertensive Heart Disease
5. Other Heart Disease
6. Pneumonia
7. Cirrhosis and Fatty Liver
8. All Other

UNNATURAL
1. Non-Work-Associated Automobile Accidents
2. Work-Associated Automobile Accidents
3. Non-Automobile Work-Associated Accidents
4. Drowning
5. Poisoning
6. Homocide
7. Suicide
8. All Other

Autopsy - Whether or not there was an autopsy was noted for use in determining the accuracy of the assigned cause of death and the thoroughness of the coroner's investigation.

RESULTS

The results are presented in thirteen tables arranged in the following pattern:

1. Tables 1 and 2 involve the establishment of the sudden death population and also pertain to the study of reporting.

2. Tables 3-5 involve the study of the coroner's systems and include the bulk of the data on reporting.

3. Tables 6-9 present the demographic distribution of sudden deaths, with a comparison to all deaths.

4. Tables 10-13 include only the sudden deaths and relate the distribution of causes to the demographic variables.

5. Tables A1-6 present a breakdown by race, sex, and cause of death for each age group. These were relegated to the Appendix, however, as the small sample sizes rendered them unreliable for analysis. The data was segregated by county in all the tables. When population breakdown figures were available for the various demographic variables (see Appendix, Table B) mortality rates were calculated to permit inter-county comparisons; all such rates are per 100,000. Finally, limitations on sample size and time precluded any analysis for statistical significance.

TABLE 1

Initial Classification of All Deaths (Age 0-64) on the Basis of Death Certificates only (i.e., Prior to Validation Procedure), by County

COUNTY	SUDDEN				QUESTIONABLE				NOT SUDDEN	
	No.	% of Total Deaths	No. Valid.	% Valid.	No.	% of Total Deaths	No. Valid.	% Valid.	No.	% of Total Deaths
Stanislaus	149	23.8	117	79.8	243	38.8	153	63.0	235	36.3
Merced	106	32.5	93	87.7	116	35.6	65	56.0	104	31.9

From this table it is apparent that Merced had a higher percentage of deaths initially recorded as sudden (32.5% vs. 23.8%). Also, more of these cases were validated. This suggests that the death certificates there served as a better index to the actual incidence of sudden death.

TABLE 2

FINAL CLASSIFICATION OF ALL DEATHS FOLLOWING VALIDATION PROCEDURES, BY COUNTY

County	Total	SUDDEN		NOT SUDDEN		STILL QUESTIONABLE	
		No.	% of Total	No.	% of Total	No.	% of Total
Stanislaus	627	270	43.1	334	53.2	23	3.7
Merced	326	158	48.5	156	47.8	12	3.7
Total	953	428	44.9	490	51.4	35	3.7

Table 2 presents the results of the validation procedure and indicates that the percentage of sudden deaths was greater in Merced with a corresponding lower percentage of "Not Sudden" deaths. The percentage of cases "Still Questionable" after the validation procedure is the same in both counties.

In the table below pertaining only to coroner's cases Merced shows a greater proportion of deaths, initially recorded as sudden (43.9% vs. 33.1%).

TABLE 3

Distribution of Coroner's Cases by Initial Classification and Validation Results, by County

County	Total Coroner's Cases	Initially Sudden Death by Death Certificate				Initially Questionable by Death Certificate				Not Sudden by Death Certificate	
		No.	% Total Cases	Validated as Sudden	% of Initially Sudden Validated	No.	% Total Cases	Validated As Sudden	% of Initially Sudden Validated	No.	% Total Cases
Stanislaus	344	114	33.1	105	92.1	191	55.5	137	71.7	39	11.3
Merced	212	93	43.9	88	94.6	88	41.5	57	64.8	31	14.6
Total	556	207	37.2	193	93.2	279	50.2	194	59.5	70	12.6

While this observation has no direct bearing on reporting, the greater proportion of initially questionable cases in Stanislaus does suggest less concern for the reporting of the duration of the final illness. This inference is supported by the fact that both counties demonstrated the same percentage of initially sudden or questionable cases eventually validated (Stanislaus 79%, Merced 80%). Thus both counties had the same percentage of all deaths certified by the coroner that were sudden but reported the interval from onset to death with varying accuracy.

Table 4

DISTRIBUTION OF VALIDATED SUDDEN DEATHS
BY CORONER'S AND PHYSICIAN CASES
AUTOPSY; AGE GROUP AND COUNTY

AGE GROUP	TOTAL	CORONER'S CASES				PHYSICIAN CASES			
		Total	With Autopsy		Without Autopsy	Total	With Autopsy		Without Autopsy
			Number	Percent Total Coroner's Cases	Number		Number	Percent Total Physician's Cases	Number
	STANISLAUS								
0-19	54	53	37	69.8	16	1	-	-	1
20-39	32	32	25	78.1	7	-	-	-	-
40-64	184	157	132	84.1	25	27	3	11.1	24
Total	270	242	194	80.2	48	28	3	10.7	25
	MERCED								
0-19	24	23	18	78.3	5	1	-	-	1
20-39	41	41	38	92.7	3	-	-	-	-
40-64	93	81	79	97.5	2	12	4	33.3	8
Total	158	145	135	93.1	10	13	4	30.8	9

Table 4 provides some insight into the handling of sudden deaths by the coroner's office in each county. The observation that in Merced a greater proportion of both coroner's and physician cases were autopsied (93.1% and 30.8% respectively, vs. 80.2% and 10.7%) suggests that this higher autopsy rate would lead to better reporting in Merced. The percent of cases autopsied in Merced was higher in all three age groups, and in both counties this percentage increased with increasing age.

Table 5A

DISTRIBUTION OF VALIDATED SUDDEN DEATHS
BY CORONER'S AND PHYSICIAN'S CASES, AUTOPSY, AND CAUSE OF DEATH
STANISLAUS COUNTY

CAUSE OF DEATH	CORONER'S CASES					PHYSICIAN CASES				
		With Autopsy		Without Autopsy			With Autopsy		Without Autopsy	
	Total	Number	Per-cent	Number	Per-cent	Total	Number	Per-cent	Number	Per-cent
Nontraumatic										
Cerebrovascular Disease	5	5	100.0	-	-	-	-	-	-	-
Rheumatic Heart Disease	2	2	66.7	-	-	1	-	-	1	33.3
A.S.H.D.	16	11	44.0	5	20.0	9	1	4.0	8	32.0
Hypertensive Heart Disease	2	2	100.0	-	-	-	-	-	-	-
Other Heart Disease	23	21	61.8	2	5.9	13	2	5.9	11	32.4
Pneumonia	8	8	100.0	-	-	-	-	-	-	-
Cirrhosis and Fatty Liver	2	2	100.0	-	-	-	-	-	-	-
Other	89	85	91.4	4	4.3	4	-	-	4	4.3
Traumatic										
Non-Work Assoc. Auto	43	38	88.4	5	11.6	-	-	-	-	-
Work-Assoc. Auto	2	2	100.0	-	-	-	-	-	-	-
Non-Auto Work Assoc.	2	2	100.0	-	-	-	-	-	-	-
Drowning	9	1	11.1	8	88.9	-	-	-	-	-
Poisoning	4	1	25.0	3	75.0	-	-	-	-	-
Homicide	8	8	100.0	-	-	-	-	-	-	-
Suicide	22	5	21.7	17	73.9	1	-	-	1	4.4
Other	5	1	20.0	4	80.0	-	-	-	-	-
Total	242	194	71.8	48	17.8	28	3	1.1	2.5	9.3

In Merced all coroner's cases with a natural cause of death were autopsied, while in Stanislaus only 91.9% of such cases received an autopsy. With regard to coroner's cases by unnatural causes, Merced again shows a higher autopsy rate, though both counties show a generally lower rate among unnatural as opposed to natural causes. Again looking only at coroner's cases Merced consistently shows the greater proportion of cases within each subgroup receiving an autopsy. A similar trend is seen in the Stanislaus table with four exceptions among unnatural causes: Drownings, poisonings, suicides and "other." Among the coroner's

Table 5B

DISTRIBUTION OF VALIDATED SUDDEN DEATHS
BY CAUSE OF DEATH, CORONER'S OR PHYSICIAN CASES AND AUTOPSY
MERCED COUNTY

CAUSE OF DEATH	CORONER'S CASES					PHYSICIAN CASES				
		With Autopsy		Without Autopsy			With Autopsy		Without Autopsy	
	Total	Number	Per-cent	Number	Per-cent	Total	Number	Per-cent	Number	Per-cent
Nontraumatic										
Cerebrovascular Disease	-	-	-	-	-	1	-	-	1	100.0
Rheumatic Heart Disease	1	1	100.0	-	-	-	-	-	-	-
A.S.H.D.	14	14	93.3	-	-	1	-	-	1	6.7
Hypertensive Heart Disease	2	2	66.7	-	-	1	-	-	1	33.3
Other Heart Disease	14	14	73.7	-	-	5	1	5.3	4	21.0
Pneumonia	2	2	66.7	-	-	1	1	33.0	-	-
Cirrhosis and Fatty Liver	2	2	100.0	-	-	-	-	-	-	-
Other	22	22	84.6	-	-	4	2	7.7	2	7.7
Traumatic										
Non-Work Assoc. Auto	48	41	85.4	7	14.6	-	-	-	-	-
Work-Assoc. Auto	2	2	100.0	-	-	-	-	-	-	-
Non-Auto Work Assoc.	5	5	100.0	-	-	-	-	-	-	-
Drowning	4	3	75.0	1	25.0	-	-	-	-	-
Poisoning	1	1	100.0	-	-	-	-	-	-	-
Homicide	3	3	100.0	-	-	-	-	-	-	-
Suicide	12	12	100.0	-	-	-	-	-	-	-
Other	13	11	84.6	2	15.4	-	-	-	-	-
Total	145	135	85.4	10	6.9	13	4	2.8	9	4.9

cases in Stanislaus County the highest number of deaths by natural causes that were not autopsied were ascribed to arteriosclerotic heart disease. This is also true among the cases that were neither autopsied or certified by the coroner.

The inter-county differences here again support the general inference from previous tables that on the basis of autopsy rates alone the reporting is more likely better in Merced. It might lastly be noted that with one exception all sudden deaths from unnatural causes were handled in both counties by the coroner's office.

Table 6A

DISTRIBUTION OF ALL DEATHS AND SUDDEN DEATHS BY RACE

STANISLAUS

RACE	TOTAL POPULATION		ALL DEATHS		RACIAL GROUP MORTALITY RATE	SUDDEN DEATHS		RACIAL GROUP MORTALITY RACE BY SUDDEN DEATH
	Number	Percent	Number	Percent		Number	Percent	
White	148,055	91.1	544	86.8	367	239	88.5	161
Mexican	12,188	7.5	70	11.2	574	27	10.0	221
Negro	1,175	0.7	7	1.1	595	4	1.5	340
Other	1,176	0.7	6	0.9	510	-	-	-
Total	162,594	100.0	627		385	270		166

Table 6B

DISTRIBUTION OF ALL DEATHS AND SUDDEN DEATHS BY RACE

MERCED

RACE	TOTAL POPULATION		ALL DEATHS		RACIAL GROUP MORTALITY RATE	SUDDEN DEATHS		RACIAL GROUP MORTALITY RACE BY SUDDEN DEATH
	Number	Percent	Number	Percent		Number	Percent	
White	79,805	77.6	244	74.8	305	119	75.3	149
Mexican	15,213	14.8	45	13.8	295	21	13.3	138
Negro	5,807	5.6	34	10.4	585	17	10.8	292
Other	1,969	2.0	3	1.0	152	1	0.6	50
Total	102,794		326		317	158		153

The population in both counties is predominantly white (excluding Spanish surnames); 91.1% in Stanislaus and 77.6% in Merced. The remainder is comprised primarily of people of Spanish surname with small percentages of Negroes and "Other."

It might also be noted that in general population distribution by percent, Merced has eight times as many Negroes and twice as many people of Spanish surnames.

The mortality rate in Stanislaus County for both sudden deaths and all deaths is slightly higher than in Merced, with the mortality rate in the Spanish surname population of Stanislaus twice that in Merced.

Mortality rates for all and sudden deaths in Stanislaus were consistently higher in the non-white race groups although the small population within these groups limits the reliability to racial comparisons. In Merced only the Negro mortality rates exceeded those of whites.

TABLE 7

Distribution of All Deaths and Sudden Deaths by Age and County

County	Age	Populations	Total # Deaths	Mortality Rate All Deaths	# Sudden Deaths	Mortality Rate Sudden Deaths
Stanislaus	0-19 yrs.	71,051	128	180	54	76
	20-39 yrs.	42,601	60	140	32	75
	40-64 yrs.	48,942	439	896	184	375
Merced	0-19 yrs.	47,329	51	107	24	50
	20-39 yrs.	31,380	58	184	41	130
	40-64 yrs.	24,085	217	900	93	386

In the 0-19 age group mortality rates for all deaths and sudden deaths are higher in Stanislaus, whereas in the 20-39 age group Merced was higher in both rates. Mortality rates for sudden and all deaths in both counties are greatest in the 40-64 age group.

Table 8A

DISTRIBUTION OF SUDDEN DEATH BY RACE, SEX, AND AGE GROUP

(All rates/100,000 population)

AGE GROUP	RACE AND SEX															
	WM		WF		MM		MF		NM		NF		OM		OF	
	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE
	STANISLAUS															
0-19	31	96	11	35	8	271	3	99	1	392	-	-	-	-	-	-
20-39	19	104	6	30	5	274	1	55	-	-	1	621	-	-	-	-
40-64	131	578	41	178	8	619	2	156	2	1,000	-	-	-	-	-	-
Total	181	247	58	78	21	346	6	98	3	488	1	178	-	-	-	-
	MERCED															
0-19	13	71	6	35	3	74	-	-	1	72	1	72	-	-	-	-
20-39	24	190	9	75	4	190	1	47	2	197	1	123	-	-	-	-
40-64	55	546	12	128	11	658	2	146	12	1,651	-	-	-	-	1	602
Total	92	224	27	70	18	229	3	41	15	480	2	74	-	-	1	110

Tables 8A and 8B offer a further breakdown of the data presented in tables 6 and 7, refining the patterns of mortality rates demonstrated in previous tables and revealing new patterns as well.

Generally higher mortality rates (increases of 50-100%) are found in the males within each racial group in both counties. The mortality rates for both sudden and all deaths are higher in Stanislaus, particularly in the male and female Spanish surname groups. For all deaths the greatest mortality rate within each county appears in male Negroes in the 40-64 age group.

Outside these more marked general observations other contrasts between population sub groups are too small for meaningful extractions.

Table 8B

DISTRIBUTION OF ALL DEATHS BY RACE, SEX, AND AGE GROUP

(All rates/100,000 population)

AGE GROUP	RACE AND SEX															
	WM		WF		MM		MF		NM		NF		OM		OF	
	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE	#	RATE
	STANISLAUS															
0-19	69	213	34	108	12	407	10	329	3	1,176	-	-	-	-	-	-
20-39	29	159	22	109	7	383	1	55	-	-	1	621	-	-	-	-
40-64	261	1,152	129	558	28	2,167	12	938	3	1,500	-	-	4	2,000	2	1,408
Total	359	490	185	247	47	774	23	376	6	977	1	178	4	651	2	356
	MERCED															
0-19	27	147	10	58	4	98	3	78	2	145	5	362	-	-	-	-
20-39	30	238	16	133	4	190	4	186	2	197	2	246	-	-	-	-
40-64	105	1,043	55	588	19	1,136	11	804	23	3,163	-	-	1	406	2	1,205
Total	162	394	81	209	27	344	18	244	27	865	7	261	1	94	2	220

Table 9

VALIDATED SUDDEN DEATHS
BY OCCUPATION, AND COUNTY

COUNTY	OCCUPATION					
	Agriculture			Nonagriculture		
	Number	Percent Total Sudden Death	Rate*	Number	Percent Total Sudden Death	Rate*
Stanislaus	57	21.1	599	213	78.9	139
Merced	40	25.3	391	118	74.7	127
Total	97	22.7	491	331	77.3	134

* Rates here were figured against the Agricultural and Nonagricultural segments of the population of each county.

While urban residence accounts for about 55% of the sudden death cases in each county, there was no population breakdown by residence to indicate rate deviations between residential groups. Tables 10A and 10B show no major differences between percentages of all deaths versus sudden deaths within a given residential group.

Table 10A

SUDDEN DEATHS AND ALL DEATHS BY RESIDENCE, AND STANISLAUS COUNTY

RESIDENCE	SUDDEN DEATHS		ALL DEATHS	
	Number	Percent Total Sudden	Number	Percent Total All Deaths
Urban	151	56.3	329	54.0
Farm	28	10.4	83	13.6
Not Farm	89	33.3	197	32.4
Total*	268	100.0	609	100.0

* Twenty (20) death certificates lacked a place of residence and have been eliminated from this table; 2 from Sudden and 18 from All Deaths.

While agricultural employees account for only 25% of the sudden deaths in both counties, the sudden death mortality rate was much higher than in the non-agricultural workers in the two counties had similar mortality rates. This partly localizes the increased sudden death rate in Stanislaus County as demonstrated by previous charts.

Table 10B

SUDDEN DEATHS AND ALL DEATHS
BY RESIDENCE, AND MERCED COUNTY

RESIDENCE	SUDDEN DEATHS		ALL DEATHS	
	Number	Percent Total Sudden	Number	Percent Total All Deaths
Urban	98	63.3	180	56.1
Farm	23	14.8	52	16.2
Not Farm	34	21.9	89	27.7
Total*	155	100.0	321	100.0

* Eight (8) death certificates lacked a place of residence and have been eliminated from this table; 3 from Sudden and 5 from All Deaths.

Table 11A

DISTRIBUTION OF SUDDEN DEATHS BY RACE, SEX AND CAUSE
STANISLAUS COUNTY

CAUSE OF DEATH	RACE AND SEX															
	WM		WF		MM		MF		NM		NF		OM		OF	
	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Non-Traumatic																
Cerebrovascular	1	1.4	3	4.0	-	-	1	16.3	-	-	-	-	-	-	-	-
Rheumatic H.D.	2	2.7	1	1.3	-	-	-	-	-	-	-	-	-	-	-	-
ASHD	16	21.8	5	6.7	4	65.9	-	-	-	-	-	-	-	-	-	-
Hypertensive H.D.	1	1.4	1	1.3	-	-	-	-	-	-	-	-	-	-	-	-
Other H.D.	31	42.3	5	6.7	-	-	-	-	-	-	-	-	-	-	-	-
Pneumonia	5	6.8	3	4.0	-	-	-	-	-	-	-	-	-	-	-	-
Cirrhosis and Fatty Liver	2	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	63	86.0	20	26.7	6	98.9	3	49.0	1	162.9	-	-	-	-	-	-
Total	121	165.1	38	50.8	10	164.8	4	65.4	1	162.9	-	-	-	-	-	-
Traumatic																
Non-Work Assoc. Auto	24	32.7	10	13.4	6	98.9	2	32.7	1	162.9	-	-	-	-	-	-
Work-Assoc. Auto	1	1.4	-	-	1	16.5	-	-	-	-	-	-	-	-	-	-
Non-Auto Assoc. Work	1	1.4	1	1.3	-	-	-	-	1	162.9	-	-	-	-	-	-
Drowning	8	10.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poisoning	1	1.4	3	4.0	-	-	-	-	-	-	-	-	-	-	-	-
Homicide	6	8.2	1	1.3	-	-	-	-	-	-	1	178.2	-	-	-	-
Suicide	16	21.8	4	5.3	3	49.4	-	-	-	-	-	-	-	-	-	-
Other	3	4.1	1	1.3	1	16.5	-	-	-	-	-	-	-	-	-	-
Total	60	81.9	20	26.7	11	181.2	2	32.7	2	325.7	1	178.2	-	-	-	-

Tables 11A and B, giving a race-sex-cause of death breakdown, indicate there is approximately a 3:1 ratio of males to females in the rate of both natural and unnatural sudden deaths.

Table 11B

DISTRIBUTION OF SUDDEN DEATHS BY RACE, SEX AND CAUSE
MERCED COUNTY

CAUSE OF DEATH	RACE AND SEX															
	WM		WF		MM		MF		NM		NF		OM		OF	
	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Non-Traumatic																
Cerebrovascular	1	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatic H.D.	-	-	-	-	1	12.7	-	-	-	-	-	-	-	-	-	-
ASHD	14	34.1	-	-	-	-	-	-	1	32.0	-	-	-	-	-	-
Hypertensive H.D.	-	-	-	-	-	-	-	-	3	96.1	-	-	-	-	-	-
Other H.D.	12	29.2	2	5.2	2	25.5	1	13.6	1	32.0	-	-	-	-	1	109.8
Pneumonia	2	4.9	-	-	-	-	-	-	1	32.0	-	-	-	-	-	-
Cirrhosis and Fatty Liver	1	2.4	1	2.6	-	-	-	-	-	-	-	-	-	-	-	-
Other	13	31.7	6	15.5	3	38.2	1	13.6	2	64.1	1	37.2	-	-	-	-
Total	43	104.7	9	23.2	6	76.4	2	27.2	8	256.2	1	37.2	-	-	1	109.8
Traumatic																
Non-Work Assoc. Auto	26	63.3	13	33.6	5	63.7	1	13.6	3	96.1	-	-	-	-	-	-
Work-Assoc. Auto	2	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-Auto Assoc. Work	4	9.7	-	-	1	12.7	-	-	-	-	-	-	-	-	-	-
Drowning	2	4.9	-	-	1	12.7	-	-	-	-	1	37.2	-	-	-	-
Poisoning	1	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Homicide	-	-	1	2.6	1	12.7	-	-	1	32.0	-	-	-	-	-	-
Suicide	7	17.0	2	5.2	2	25.5	-	-	1	32.0	-	-	-	-	-	-
Other	7	17.0	2	5.2	2	25.5	-	-	2	64.1	-	-	-	-	-	-
Total	49	119.3	18	46.4	12	152.9	1	13.6	7	224.2	-	-	-	-	-	-

Tables A1-6 (in Appendix) offering a further age breakdown, socialize the population at greatest risk of natural death in the 40-64 year-old males. Additional analysis of incidence patterns by race, age, and cause of death would be unreliable due to the limited sample sizes.

Table 12A

DISTRIBUTION OF SUDDEN DEATH
BY OCCUPATION, RACE AND CAUSE OF DEATH
STANISLAUS COUNTY

CAUSE OF DEATH	AGRICULTURAL				NONAGRICULTURAL			
	White		Nonwhite		White		Nonwhite	
	Number	% Total S.D	Number	% Total S.D	Number	% Total S.D	Number	% Total S.D
Nontraumatic								
C.V.D.	2	0.7	-	-	2	0.7	1	0.4
Rheumatic Heart D.	-	-	-	-	3	1.1	-	-
A.S.H.D.	6	2.2	2	0.7	15	5.6	2	0.7
Hypertensive Heart Disease	-	-	-	-	2	0.7	-	-
Other Heart Disease	10	3.7	-	-	26	9.6	-	-
Pneumonia	2	0.7	-	-	6	2.2	-	-
Cirrhosis and Fatty Liver	1	0.4	-	-	1	0.4	-	-
Other	16	5.9	1	0.4	67	24.8	9	3.3
Total	37	13.7	3	1.1	122	46.1	9	4.4
Traumatic								
Non-Work Assoc. Auto	7	2.6	3	1.1	27	10.0	6	2.2
Work-Assoc. Auto	1	0.4	-	-	-	-	1	0.4
Non-Auto Work Assoc.	-	-	-	-	2	0.7	-	-
Drowning	-	-	-	-	8	3.0	1	0.4
Poisoning	-	-	-	-	4	1.5	-	-
Homicide	1	0.4	-	-	6	2.2	1	0.4
Suicide	5	1.9	-	-	15	5.6	3	1.1
Other	-	-	-	-	4	1.5	1	0.4
Total	14	5.2	3	1.1	66	17.4	13	4.9

Merced County's percentage of unnatural deaths within both occupational groups is almost twice that of Stanislaus. In the non-agricultural group in Merced this difference is accounted for by the increased incidence of non-work associated auto deaths (26.0%, 12.2%). There is a corresponding decrease in the percentage of natural deaths in Merced. While both Stanislaus and Merced have a high incidence in the natural causes of death listed as "other"; the percentage is higher in Stanislaus (34.4%, 16.5%), with the largest concentration in the non-agricultural workers (28%).

Table 12B

DISTRIBUTION OF SUDDEN DEATHS
BY OCCUPATION, RACE AND CAUSE OF DEATH
MERCED COUNTY

CAUSE OF DEATH	AGRICULTURAL				NONAGRICULTURAL			
	White		Nonwhite		White		Nonwhite	
	Number	% Total S.D.	Number	% Total S.D.	Number	% Total S.D.	Number	% Total S.D.
Nontraumatic								
C.V.D.	-	-	-	-	1	0.6	-	-
Rheumatic Heart D.	-	-	1	0.6	-	-	-	-
A.S.H.D.	3	1.9	-	-	11	7.0	1	0.6
Hypertensive Heart Disease	-	-	2	1.3	-	-	1	0.6
Other Heart D.	4	2.5	3	1.9	10	6.3	2	1.3
Pneumonia	-	-	-	-	2	1.3	1	0.6
Fatty Liver Cirrhosis	-	-	-	-	2	1.3	-	-
Other	5	3.2	3	1.9	14	8.9	4	2.5
Total	12	7.6	9	5.7	40	25.4	9	5.6
Traumatic								
Non-Work Assoc. Auto	4	2.5	3	1.9	35	22.2	6	3.8
Work Assoc. Auto	1	0.6	-	-	1	0.6	-	-
Work Assoc. Non-Auto	1	0.6	-	-	3	1.9	1	0.6
Drowning	1	0.6	-	-	1	0.6	2	1.3
Poisoning	-	-	-	-	1	0.6	-	-
Homicide	-	-	2	1.3	1	0.6	-	-
Suicide	-	-	2	1.3	9	5.7	1	0.6
Other	2	1.3	3	1.9	7	4.4	1	0.6
Total	9	5.7	10	6.3	58	36.6	11	6.9

Further analysis is limited by the small sample size in each category.

The data from Table 10 confirms the high incidence of non-work-associated auto deaths in Merced County originally noted in Tables 9A and 9B. Also confirmed is the large concentration of natural deaths in the "other" category. Comparison of all deaths to sudden deaths within this category indicates that these deaths were largely of a non-sudden nature.

All Heart Diseases, as the combination of four sub groups, accounts for almost 25% of all sudden deaths in both counties.

Table 13

SUDDEN DEATHS AND ALL DEATHS BY CAUSE OF DEATH, BY COUNTY

CAUSE OF DEATH	STANISLAUS						MERCED					
	Sudden Deaths			All Deaths			Sudden Deaths			All Deaths		
	#	%	Rate	#	%	Rate	#	%	Rate	#	%	Rate
Nontraumatic												
C.V.D.	5	1.9	3	15	2.4	9	1	.6	1	4	1.2	3
Rheumatic Heart D.	3	1.1	1	8	1.3	4	1	.6	1	5	1.5	4
A.S.H.D.	25	9.3	15	42	6.7	25	15	9.5	14	24	7.4	23
Hypertensive Heart Disease	2	.7	1	5	.8	3	3	1.9	2	6	1.8	5
Other Heart D.	36	13.3	22	70	11.2	43	19	12.0	18	36	11.0	35
Pneumonia	8	3.0	4	15	2.4	9	3	1.9	2	8	2.5	7
Fatty Liver Cirrhosis	2	.7	1	18	2.9	11	2	1.3	1	12	3.7	11
Other	93	34.4	57	332	53.0	204	26	16.5	25	135	41.4	131
	174	64.4		505	80.5		70	44.3		230	70.6	
Traumatic												
Non-Work Assoc. Auto	43	15.9	26	51	8.1	31	48	30.4	46	53	16.3	51
Work Assoc. Auto	2	.7	1	2	.3	1	2	1.3	1	2	.6	1
Work Assoc. Non-Auto	2	.7	1	3	.5	1	5	3.2	4	6	1.8	5
Drowning	9	3.3	5	9	1.4	5	4	2.5	3	4	1.2	3
Poisoning	4	1.5	2	6	1.0	3	1	.6	1	1	.3	1
Homicide	8	3.0	4	10	1.6	6	3	1.9	2	3	.9	2
Suicide	23	8.5	14	27	4.3	16	12	7.6	11	12	3.7	11
Other	5	1.9	3	14	2.2	8	13	8.2	12	15	4.6	14
	96	35.6		122	19.5		88	55.7		96	29.4	
Total	270			627			158			326		

Note: Rate per 100,000

Within each unnatural cause category the relatively high ratio of sudden deaths to all deaths indicates that most unnatural fatalities are sudden.

DISCUSSION

The coroner in Stanislaus County has a staff composed of a deputy-coroner and a secretary who do much of the necessary research on the individual cases. This office also retains one pathologist to do all of their autopsies. In Merced which has a smaller population the coroner's office is not as well funded, so that the coroner has no staff. All the autopsies are carried out by a group of three pathologists. The coroner's reports as to the circumstances surrounding the final illness and the autopsy reports are much more detailed and complete in Stanislaus than in Merced.

Although the counties are contiguous, they differ significantly in their socio-economic make up. They are both thought of as primarily agricultural counties, but Stanislaus has a good many large industries while Merced has practically none. This difference in the economies of the counties is reflected in the density of the medical personnel and facilities. It is especially relevant for this study to note that the doctor to patient ratio in Stanislaus is about 1 to 900, while in Merced it is one half that or roughly 1 to 1800

First, let us consider how the coroners' offices in the two counties compare as to the reporting of the duration of the final illness on the death certificates. It was noted that Merced had 10% more deaths that were initially sudden, and this was considered to be evidence for stating that the death certificates in Merced are a better index of the actual incidence of sudden death. Of the deaths initially reported as sudden 76% were coroner's cases in Stanislaus and 88% were such in Merced. This difference is reversed in the initially questionable category with Stanislaus being about 10% higher than Merced. Of this initially questionable group 83% of the cases in the former county and 76% of those in the latter were certified by the coroner. From this it is apparent that a very high percentage of the initially questionable cases in both counties were actually sudden deaths.

However, in both counties the same percentage of all initially sudden and questionable coroner's cases were validated as being sudden. From this last comparison it might be anticipated that the percentage of deaths in both counties that are initially sudden and questionable would be the same. This is not the case. The fact that the coroners' offices function independently helps to explain this observed difference. The fact is that the differences are much greater than even these tables would suggest.

The death certificates with the most exact interval reporting are those for deaths due to traumatic or unnatural causes. In these cases both the time of the accident for instance, and of the death are on the certificate. In Merced 58% and in Stanislaus 30% of the coroner's cases were due to unnatural etiologies. Excluding these deaths and considering those due only to natural causes, an even more striking difference between the two counties is found: In Stanislaus 84% of the coroner certified natural deaths that were classified as sudden were validated, while in Merced the percentage of these cases validated was only 33%. Of all the coroner's cases due to natural causes 75% were validated in Stanislaus and 65% in Merced.

It now seems that among the coroner's cases with natural causes Stanislaus has actually more reliable reporting for the duration of the final illness. But in the whole what is more important is that among deaths by natural causes both county coroners' offices are remiss in reporting the duration of the final illness. This is illustrated by the fact that in Stanislaus 89% of all the validated cases of natural sudden deaths and in Merced 82% of these cases were initially considered to be questionable.

Another means for comparing the coroners' offices is to study the quality of the reporting of the causes of sudden death. This was done by comparing the autopsy rates in the two counties, since there were no cases in which the final diagnosis on the death certificate was changed. The coroner's cases that have not been autopsied are especially important as they show whether any cause of death is a catch-all for unexplained cases of sudden death.

The fact that all the deaths in Merced County due to natural causes that came under the coroner's jurisdiction and 88% of those by unnatural or traumatic causes autopsied, implies that the quality of reporting of the cause of death in this county is superior to that of Stanislaus. The coroner in Stanislaus diagnosed a high proportion of the non-autopsied sudden deaths by natural causes to be due to ASHD. This fact could be significant to someone studying the rate for this disease among the residents of this county. In the cases that did not come under the coroner's jurisdiction in this county, ASHD and "Other Heart Disease" make up a large proportion of the diagnoses of the cause of sudden death. This suggests that the mortality rate by ASHD might be significantly over-reported here.

Kuller[1] stated that in Baltimore the medical examiner certifies more natural sudden deaths in the 20-39 (85%) than in the 40-69 (52.8%) age group. Among the sudden deaths in Stanislaus and Merced a similar trend is noted. However, it is important that whereas the percentage of the sudden deaths certified by the coroner is decreasing with increasing age, the percentage of cases autopsied is increasing. There is nothing in these tables that explains why this increase should occur. The only explanation we could hypothesize is that death in the younger age groups are less likely to be compounded with other diseases and so the coroner might consider it to be unnecessary to authorize an autopsy. Also there are no tables which compare the cause of death, the age group, coroner's certification and whether the case was autopsied or not.

In conclusion then, the quality of the coroner's reporting can be studied in two ways: With respect to interval, and with respect to cause. Since the exact interval is stated on the death certificate in all cases of traumatic or unnatural deaths in a box that is not the same as the one used for recording the duration of the final illness, these cases should not be considered when comparing the two counties. When only natural sudden deaths were considered, it was found that among coroner certified cases initially sudden by the reported interval the reporting in Stanislaus County was much more reliable than Merced. However, in both counties the predominant number of cases that were initially classified as questionable from the interval had been certified by the coroner, showing that it is the coroner and not the physician who is responsible for the bulk of this insufficient reporting.

As for the quality of the reporting of the cause of death there is only one outstanding difference between the two counties and that is that in Merced all the coroner's cases ascribed to natural causes and a higher percentage of those due to unnatural causes were certified than in Stanislaus. Thus it can be implied that the reporting of the cause of death is more reliable in Merced.

Several parameters were utilized to define the high-risk groups within a rural population.

There was approximately a 3:1 ratio of males to females in sudden death rates.

The highest rate of natural sudden deaths occurred within the 40-64 age group.

Higher mortality rates occurred in Stanislaus County, despite the greater availability of medical care. This may be attributed to the greater percentage of the population within the 40-64 age group in that county (30%, 23%).

Approximately 25% of the sudden deaths in both counties occurred among agricultural workers, in which group the sudden death rate was over three times greater than in the non-agricultural group. In the agricultural group the sudden death rate was 50% greater in Stanislaus.

Merced County had over twice the mortality rate in non-work associated auto accidents. This condition was influenced by factors unique to Merced County: poor roads, heavy trucking traffic on these ancillary secondary highways, and very limited accessibility of emergency treatment.

Stanislaus County had a higher ratio of sudden natural deaths to all sudden deaths. The lower proportion in Merced is related in part to the greater incidence of auto accidents there. Heart diseases accounted for 45.5% of the sudden natural deaths.

The overall percentage of sudden natural deaths to all natural deaths was comparable to the percentage presented in Kuller's urban studies (314). In the 20-64 age group 35.7% of the deaths in this study were sudden as opposed to 32% in Baltimore (3). It may also be noted that in the 20-39 age group there was only 20.4% sudden natural deaths in contrast to 31.4% in the urban study[4], though the rural percentage may not be reliable due to the small sample size.

In general the data seems to point toward some characteristics of a high risk rural population--males, non-whites, agricultural occupation, and age over 40.

APPENDIX

Table A1

DISTRIBUTION OF SUDDEN DEATHS BY RACE, SEX, AND CAUSE OF DEATH STANISLAUS COUNTY AND AGE GROUP (0-19 yrs.)

CAUSE OF DEATH	WM		WF		MM		MF		NM		NF		OM		OF	
	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Nontraumatic																
C.V.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatic Heart D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A.S.H.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypertensive Heart Disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Heart D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pneumonia	2	6	1	3	-	-	-	-	-	-	-	-	-	-	-	-
Fatty Liver Cirrhosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	10	30	1	3	3	101	2	65	-	-	-	-	-	-	-	-
Traumatic																
Non-Work Assoc. Auto	10	30	5	15	3	101	1	32	-	-	-	-	-	-	-	-
Work Assoc. Auto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Work Assoc. Non-Auto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drowning	4	12	-	-	-	-	-	-	1	392	-	-	-	-	-	-
Poisoning	1	3	3	9	-	-	-	-	-	-	-	-	-	-	-	-
Homicide	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suicide	-	-	-	-	1	33	-	-	-	-	-	-	-	-	-	-
Other	2	6	1	3	1	33	-	-	-	-	-	-	-	-	-	-

Note: Rate per 100,000

Table A2

DISTRIBUTION OF SUDDEN DEATHS BY RACE, SEX, AND CAUSE OF DEATH
MERCED COUNTY AND AGE GROUP (0-19 yrs.)

CAUSE OF DEATH	WM		WF		MM		MF		NM		NF		OM		OF	
	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Nontraumatic																
C.V.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatic Heart D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A.S.H.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypertensive Heart Disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Heart D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pneumonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatty Liver Cirrhosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	1	5	1	5	1	24	-	-	-	-	-	-	-	-	-	-
Traumatic																
Non-Work Assoc. Auto	8	43	3	17	2	49	-	-	1	72	-	-	-	-	-	-
Work Assoc. Auto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Work Assoc. Non-Auto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drowning	-	-	-	-	-	-	-	-	-	-	1	72	-	-	-	-
Poisoning	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Homicide	-	-	6	34	-	-	-	-	-	-	-	-	-	-	-	-
Suicide	2	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	1	5	1	5	-	-	-	-	-	-	-	-	-	-	-	-

Note: Rate per 100,000

Table A3

DISTRIBUTION OF SUDDEN DEATHS BY RACE, SEX, AND CAUSE OF DEATH
STANISLAUS COUNTY AND AGE GROUP (20-39 yrs.)

CAUSE OF DEATH	WM		WF		MM		MF		NM		NF		OM		OF	
	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Nontraumatic																
C.V.D.	-	-	-	-	-	-	1	55	-	-	-	-	-	-	-	-
Rheumatic Heart D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A.S.H.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypertensive Heart Disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Heart D.	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pneumonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatty Liver Cirrhosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	1	5	1	4	-	-	-	-	-	-	-	-	-	-	-	-
Traumatic																
Non-Work Assoc. Auto	7	38	3	14	2	109	-	-	-	-	-	-	-	-	-	-
Work Assoc. Auto	-	-	-	-	1	54	-	-	-	-	-	-	-	-	-	-
Work Assoc. Non-Auto	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drowning	2	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poisoning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Homicide	3	16	2	9	-	-	-	-	-	-	1	621	-	-	-	-
Suicide	4	21	-	-	2	109	-	-	-	-	-	-	-	-	-	-
Other	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-

Note: Rate per 100,000

Table A4

DISTRIBUTION OF SUDDEN DEATHS BY RACE, SEX, AND CAUSE OF DEATH
MERCED COUNTY AND AGE GROUP (20-39 yrs.)

CAUSE OF DEATH	WM		WF		MM		MF		NM		NF		OM		OF	
	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Nontraumatic																
C.V.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatic Heart D.	-	-	-	-	1	47	-	-	-	-	-	-	-	-	-	-
A.S.H.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypertensive Heart Disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Heart D.	-	-	1	8	1	47	-	-	-	-	-	-	-	-	-	-
Pneumonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fatty Liver Cirrhosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	1	7	1	8	-	-	-	-	-	-	1	122	-	-	-	-
Traumatic																
Non-Work Assoc. Auto	12	95	7	58	1	47	1	46	1	98	-	-	-	-	-	-
Work Assoc. Auto	2	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Work Assoc. Non-Auto	4	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drowning	-	-	-	-	1	47	-	-	-	-	-	-	-	-	-	-
Poisoning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Homicide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suicide	2	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	3	23	-	-	-	-	-	-	1	98	-	-	-	-	-	-

Note: Rate per 100,000

Table A5

DISTRIBUTION OF SUDDEN DEATHS BY RACE, SEX, AND CAUSE OF DEATH
STANISLAUS COUNTY AND AGE GROUP (40-64 yrs.)

CAUSE OF DEATH	WM		WF		MM		MF		NM		NF		OM		OF	
	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Nontraumatic																
C.V.D.	1	4	3	12	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatic Heart D.	2	8	1	4	-	-	-	-	-	-	-	-	-	-	-	-
A.S.H.D.	16	70	5	21	4	309	-	-	-	-	-	-	-	-	-	-
Hypertensive Heart Disease	1	4	1	4	-	-	-	-	-	-	-	-	-	-	-	-
Other Heart D.	30	132	5	21	-	-	-	-	-	-	-	-	-	-	-	-
Pneumonia	3	13	2	8	-	-	-	-	-	-	-	-	-	-	-	-
Fatty Liver Cirrhosis	2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	52	229	18	77	3	232	1	78	1	500	-	-	-	-	-	-
Traumatic																
Non-Work Assoc. Auto	7	30	2	8	1	77	1	78	1	500	-	-	-	-	-	-
Work Assoc. Auto	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Work Assoc. Non-Auto	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-
Drowning	2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poisoning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Homicide	1	4	1	4	-	-	-	-	-	-	-	-	-	-	-	-
Suicide	12	52	2	8	-	-	-	-	-	-	-	-	-	-	-	-
Other	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Rate per 100,000

Table A6

DISTRIBUTION OF SUDDEN DEATHS BY RACE, SEX, AND CAUSE OF DEATH MERCED COUNTY AND AGE GROUP (40-64 yrs.)

CAUSE OF DEATH	WM		WF		MM		MF		NM		NF		OM		OF	
	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Nontraumatic																
C.V.D.	1	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatic Heart D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A.S.H.D.	14	139	-	-	-	-	-	-	1	137	-	-	-	-	-	-
Hypertensive Heart Disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Heart D.	12	119	1	10	1	59	1	73	3	412	-	-	-	-	-	-
Pneumonia	2	19	-	-	-	-	-	-	1	137	-	-	-	-	1	602
Fatty Liver Cirrhosis	1	9	1	10	-	-	-	-	1	137	-	-	-	-	-	-
Other	11	109	4	42	2	119	1	73	2	275	-	-	-	-	-	-
Traumatic																
Non-Work Assoc. Auto	6	59	3	32	2	119	-	-	1	137	-	-	-	-	-	-
Work Assoc. Auto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Work Assoc. Non-Auto	-	-	-	-	1	59	-	-	-	-	-	-	-	-	-	-
Drowning	2	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poisoning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Homicide	-	-	-	-	1	59	-	-	-	-	-	-	-	-	-	-
Suicide	3	29	2	21	2	119	-	-	1	137	-	-	-	-	-	-
Other	3	29	1	10	2	119	-	-	1	137	-	-	-	-	-	-

Note: Rate per 100,000

Table B

BASE POPULATION BY RACE, SEX, AGE GROUP, AND COUNTY

AGE	TOTAL POPULATION			WHITES LESS MEXICANS			MEXICAN			NEGRO			OTHER		
	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female
	MERCED														
0-19	47,329	24,282	23,047	35,709	18,374	17,335	7,927	4,078	3,849	2,761	1,378	1,383	936	467	469
20-39	31,380	16,050	15,330	24,685	12,622	12,063	4,244	2,099	2,145	1,831	1,017	814	621	345	276
40-64	24,085	12,763	11,322	19,411	10,065	9,346	3,042	1,673	1,369	1,215	727	488	412	246	166
Total 0-64	102,794	53,095	49,699	79,805	41,061	38,744	15,213	7,850	7,363	5,807	3,122	2,685	1,969	1,058	911
	STANISLAUS														
0-19	71,051	35,930	35,121	63,960	32,424	31,536	5,984	2,949	3,035	513	255	258	513	255	258
20-39	42,601	20,325	22,276	38,346	18,211	20,135	3,632	1,828	1,804	320	159	161	320	159	161
40-64	48,942	24,390	24,552	45,749	22,652	23,097	2,572	1,292	1,280	342	200	142	342	200	142
Total 0-64	162,594	80,645	81,949	148,055	73,287	74,768	12,188	6,069	6,119	1,175	614	561	1,175	614	561